Barriers and strategies on adoption of e-learning in Tanzanian higher learning institutions: Lessons for adopters

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ABSTRACT

Tanzanian Higher learning institutions (HLIs) are faced with challenges of adopting e-learning in education. This study involved experts in e-learning to examine barriers of adopting e-learning and the best strategies to address them. Data were gathered from a series of semi-structured interviews with e-learning experts from two HLIs in Tanzania.

Five major barriers were identified: poor infrastructure; financial constraints; inadequate support; lack of e-learning knowledge and teachers' resistance to change. The study further describes best practice approaches used by the two HLIs to address each of the challenges. It is recommended that training in e-learning needs to be provided to teachers and administrators; provide financial, technical and managerial support geared towards adoption. Successful adoption of e-learning requires a strategic approach that factors out barriers identified in this study and, which involve all education stakeholders.

Keywords: *e-learning; e-learning adoption; e-learning experts; higher learning institutions.*

INTRODUCTION

Over the past decade, there has been a substantial Information and Communications Technology (ICT) development aimed at providing learning and teaching to a wider group of learners around the world. Throughout the world HLIs are increasingly turning to various electronic technologies (commonly termed as *e-learning*) to support and enhance their learning and teaching activities (Glenn 2008; Al-Senaidi *et al.*, 2009; Meenakshi 2013). Many definitions of e-learning exist (see, for example, Farrell 2003, p.9; Holmes & Gardner 2006, p. 14; Weller 2007, p. 5; Sangra et al., 2012, p. 152), but for the purposes of this study e-learning is taken to be all aspects of electronically supported learning (whether in networked/non-networked environments) whereby the learner is interacting with teachers, content and other learners regardless of place and time.

E-learning is viewed as an essential component for any modern education institution in learning as well as teaching, and it has also challenged HLIs to redefine their teaching and research practices (Guri-Rosenblit 2009; Castillo-Merino & Serradell-Lopez 2014). Some significant advantages of e-learning include improved access to quality educational materials (Ally 2008); learning possibilities through simulations, multi-media presentations as well as electronic communication and collaboration (Sife *et al.*, 2007; Guri-Rosenblit 2009); and learning flexibility such that learners can have control over the content, learning sequence, and pace of learning (Hill 2003; Bhuasiri *et al.*, 2012).

Despite the benefits e-learning can offer, the adoption of e-learning in HLIs faces a number of challenges (Rolfe et al., 2008; Nagunwa & Lwoga 2012). Similar studies available revealed many challenges to e-learning adoption process, however, most of them had used teachers and/or students as sources of data to arrive at their conclusions and recommendations. In contrast, this

study involved experts of e-learning technologies from two established Tanzanian HLIs that conducts e-learning programmes to examine barriers of adopting e-learning and best strategies used to achieve e-learning. The researchers believe that data generated from the voice of professionals will represent the actual experience of e-learning adoption, implementation and support in HLIs rather than data generated from teachers and/or students. Thus, the aim of this study was to gain further understanding of the barriers hindering adoption of e-learning in Tanzanian HLIs and exploring possible strategies to address them. In particular, two objectives guided this study:

    i.   To explore barriers of e-learning adoption in Tanzanian HLIs.

    ii.   To identify strategies that can be used to address barriers of e-learning adoption in Tanzanian HLIs.

LITERATURE REVIEW

Challenges that hinder adoption of e-learning can be categorised into **institutional and personal** (Rolfe, et al., 2008). The most commonly cited institutional factor in earlier studies (Newton 2003; Sife et al., 2007; Nichols 2008) was poor ICT infrastructure in terms of communication, sources of power supply, computer laboratories as well as ICT technical support units; lack of ICT policy that sets milestones in place as well as lack of support from head of institutions (Gambari & Okoli, see Onasanya et al., 2010). The lack of support from head of institutions has been associated with cost of ICT training to teachers, purchasing and maintaining technologies as well as equipment for electronic learning (Nasser & Abouchedid 2000; GESCI 2009). These factors are still apparent in most recent studies (Mtebe & Raisamo 2011; Nagunwa & Lwoga 2012; Sanga et al., 2013).

Personal factors have also been associated with barriers to e-learning adoption in HLIs. Factor such as **teachers' e-learning understanding** can also have impact in e-learning adoption because through their past experiences and interactions with others, they can construct multiple meanings about e-learning, which eventually can shape their attitude toward it (Ajzen & Fishbein 1980; Fazio 2007). For example, Unwin, et al., (2010) found that many teachers defined e-learning to mean Internet access and use of e-mails for communication as well as information sharing. Literature shows that if teachers **do not understand the meaning and impact brought about by e-learning to education**, then they are likely to resist or avoid using it resulting in institutional failure to adopt e-learning (Avidov-Ungar & Eshet-Alkakay 2011).

Similarly, **teachers' resistance to change has also been cited as a personal factor** that impinges e-learning adoption (Rolfe et al., 2008; Glen 2008; Mnyanyi et al., 2010; Garrison 2011; Nihuka & Voogt 2012). Rolfe et al., (2008) refers to it as a culture of resistance, where teachers accustomed to traditional modes of instruction refuse to change. Teachers are reluctant to put their courses into an electronic format and in some occasions, they prefer the traditional methods despite having access to newer technologies (Nihuka & Voogt 2012). Literature associates teachers' reluctance to change with self-efficacy toward e-learning (Ong & Lai 2006), lack of ICT skills (Cavas et al.,2009; Buabeng-Andoh 2012), lack of incentives that motivate adoption (Mnyanyi et al.,2010; Saekow & Samson 2011), generational division between older and younger teachers in responding to e-learning (Jones & Shao 2011) and attitudinal factors (Teo & Ursavas 2012; Pynoo et al., 2012).

METHODOLOGY

Seven e-learning experts from two HLIs were involved in face-to-face, semi-structured interviews. They were purposively selected based on their professional roles, expertise, academic qualification and their direct involvement in e-learning programmes in a HLI. The e-learning experts in these institutions administer issues related to LMS installation, security, operation and support to users. In addition, they conduct training for teachers on how to convert learning material into an electronic format, upload learning material into the LMS systems, engage student in e-learning environments as well as evaluate students' learning and provide feedback. They are also involved in designing online instructions for LMS users. Table 1 below displays their demographic characteristics.

In facilitating learning, the two institutions involved in this study have developed e-learning platforms using Moodle where most of the education resources are placed for students to use (see http://elms.out.ac.tz/login/index.php and http://lms.udsm.ac.tz accessed on 12/04/2015). Students access learning materials and conduct online discussions with their lecturers through these systems. The e-learning programmes have a few face-to-face sessions that are conducted at their campuses and/or open and distance learning centres. To date, through blended learning these institutions offers Bachelor of Business Administration, Master of Engineering Management, Post-Graduate Diploma in Education and a Post-Graduate Diploma in Engineering Management (Kigombola 2013). Other programmes includes Masters in International Cooperation and Development, and Masters in Humanitarian Action, Cooperation and Development (OUT 2014).

This study used semi-structured interviews because it permitted flexibility on sequence of discussed issues and they also enabled participants as well as the researcher raise issues that were not included in a pre-devised interview schedule (Becker and Bryman 2004; Silverman 2011). Semi-structured interviews allow respondents to the freedom to talk about what they feel is significant to them whilst, unlike the unstructured interview, maintain the framework to ensure the key topics of the study are covered (Bell 2005).

The researcher recognized the participants' entitlement to privacy and thus, all ethical issues such as informed consent, anonymity and confidentiality were adhered to prior, during and after data collection (DPA 1998; BERA 2011). Prior to the interviews, the researcher asked interviewees' voluntary informed consent to participate in the study and to be recorded. All participants in this study were also informed about the right to withdraw from the study before or during the data collection process. In order to guarantee the anonymity of a research site and its participants as well as to protect roles of participants, the researcher disassociated names from responses by using aliases during all data analysis and interpretation processes.

Interviews were conducted in their offices at their own suggested time and lasted for about 35 minutes. Each interview session was digitally audio recorded and later on, transcribed for theme analysis.

In this study, thematic analysis (Bryman 2012) was used to identify, analyse and record themes from data extracted from respondents.

The institutions and the participants

Table 1 displays participants and institutions involved in the study.

Table 1: Respondents' demographic characteristics

ID No	Job Title	Gender	Qualification	YoE	Institution
E1	Instructional Designer	Female	Masters	7	I1
E2	Computer Programmer		Bachelors	3	
E3	Online Programmes Coordinator		Bachelors	3	
E4	System Administrator		Bachelors	6	
E5	Telecommunication Engineer	Male	Bachelors	8	I2
E6	Director of Computer Services		Doctorate	16	
E7	Multimedia Producer		Masters	10	

NB : E1 - E7 :- E-learning expert 1 to 7; YoE :-Years of Experience; I1 and I2 : Insitution 1 and 2

Five main themes emerged from semi-structured interview responses. They include according to the order of importance: poor infrastructure, financial constraints, inadequate support, lack of e-learning awareness, and teachers' resistance to change.

Barriers of e-Learning adoption in HLIs

Consistent with Sife et al., (2007), Unwin et al., (2010), Mtebe and Raisamo (2011) and Sanga et al., (2013) it was evident from this study that there are still huge infrastructural problems that need to be addressed if these institutions are to achieve e-learning. Analysis of responses revealed that problems related with **infrastructure** include inconsistent electrical power supply, insufficient Internet connectivity (bandwidth capacity) and inadequate computer laboratories and computers as exemplified by E1: "we don't have enough computers or the Internet is slow... there is a problem of power too." This was also echoed by E5, suggesting a practical reality in HLIs in the country. Similarly, financial constraints in terms of purchasing and installing ICT related facilities, operating costs of Internet services and students' economic status when it came to purchasing tools for e-learning was also cited:

"There is **lack of** enough finance to facilitate this technology because all of these issues we have been talking about need financial support to implement" (E5).

In contrast, interviewee E6 did not view finance as a problem to most institutions in the country

but said that **planning was the problem** because:

"Solutions are already there, but the thing is then how to get the solution and customize them in your environment."

Another aspect **was lack of technical and managerial support**. Technical experts are too few to support the entire community of e-learning users in HLIs. These findings are consistent with those from Sife, *et al.,* (2007) study who argue that "in most of the developing countries including Tanzania there are very few technical experts to implement and maintain ICTs" (p. 64). For example, in the present study E4 remarked that:

"Our centre supports around 10,000 students across the University…while there are very few technical staff in the centre. Roughly, we are about 15."

Expertise was also revealed to be another problem particularly "instructional designers to facilitate processing and content creation" (E7).

Along with these challenges was **lack of e-learning knowledge to most education stakeholders.** Lack of knowledge was also reported by Mtebe and Raisamo (2011). In this study, **lack of computer knowledge to some teachers** was claimed to slow down e-learning uptake in the studied institutions. Converting print-based materials to electronic format by most of teachers was a challenge. There is some indication that users of e-learning, particularly teachers did not want to show their weaknesses on ICT skills, which led to another problem, that is, **resistance to change**.

Resistance to change was associated with fear of adopting new technologies, fear of exposing one's ignorance, poor mind-set, old age, subject discipline, low attitude towards e-learning and a perception that e-learning is an extra load. Respondents accounted comments from teachers such as "I already have enough on my workload, don't add unnecessary things" and "it is not necessary for me to know computers, only blackboard and chalk are enough to me to deliver materials" to be practical indications that there is a lack of e-learning knowledge to some teachers. The next section presents strategies that can be used to address these barriers.

Strategies to address barriers of e-Learning adoption in HLIs

Table 2: Interviewees' responses on strategies to address barriers of e-learning adoption in HLIs

	Theme	Revealed Strategies	Representative Extracts
1	Strategies related to infrastructure	(a) Use of renewable energy, eg. solar power and electric generators (b) strengthening Internet bandwidth (c) use of intranet (d) extension of computer laboratories and equipment (e) Creation of regional centres to increase education access.	"*Students in remote areas do not have electricity and they don't have access to computers per se. But as an institution we have organised various centres that can help such students and provided some centres with the laboratories [and] instead of sending students materials on hard copies we use the CDs*" (E1, Female, MSc, YoE: 7).
2	Strategies to address financial constraints	(a) Collaboration with private sectors and donor organizations (b) Seek for an increase in Government financial support.	"*the Moodle which we are using was sponsored by SIDA funds…and they always facilitate on the ICT development. So we must make sure that first of all there is a financial support. We normally write proposal to university administration that will assist to set financials*" (E2, Female, BSc, YoE: 3).
3	Strategies to address lack of support	(a) Technical staff training (short and long term) (b) Establishment of independent support unit.	"*We are taking the technical staff to short courses on multimedia productions, animation, and also the academic staff for instructional design courses … So we are trying to fill the gaps* ". (E7, Male, MSc, YoE: 10).
4	Strategies on awareness raising	(a) Teachers professional development trainings (b) Training through individual consultations.	"*We give staff faculty different development programmes. Sometimes the programmes covers ICT related issues; example multimedia and internet services.These programmes are provided every month*". (E1, Male, MSc, YoE: 10).
5	Strategies to address resistance to change	(a) Educating teachers through trainings (b) Authoritative policy (c) Financial motivation.	"*It is just educating them and convincing them through training, we just invite them in the training so that they learn and gradually they come to associate it with technology*" (E5, Male, BSc, YoE: 8).

Strategies to combat problems related to infrastructure included use of renewable energy (particularly solar power) and electric generators. Findings show that institutions I2 had already invested in it:

"In our case we have tried to have a backup generator instead of relying on the national electrical power supply" (E7).

Moreover, findings identified two approaches aimed at addressing insufficient Internet connectivity. First, was to simulate online learning activities in offline environments (intranet) and second, was to establish regional learning centres facilitated with computers and learning materials using CDs:

"Students in remote areas do not have electricity and they don't have access to… computers per se. But as an institution we have organised various centres that can help such students and provided some centres with the laboratories… [and] instead of sending students materials on hard copies we use the CDs" (E1).

These strategies also gave students insight of practical activities that can be experienced in

online environment as well as provided access to education for learners who would not be able to attend courses at university campuses. Although use of regional centres was seen to be a reliable strategy particularly in offline environments, they had some limitations when it comes to Internet accessibility. When Internet was available, then the speed would be remarkably slow. This study suggests that Internet bandwidth capacity was still a constraint for a successful e-learning in such centres as well as their host institutions.

Other identified strategies were the extension of laboratories and construction of new buildings that would accommodate computer laboratories, classes as well as staff offices. In case of limitations in expansion, institutions would look for other alternatives including buying land elsewhere.

Moreover, findings suggest that institutions cannot by themselves fight against these challenges without a substantial financial support from the government and other donor organizations. Nevertheless, instead of relying only on students' tuition fee and financial support from the government, which is always not enough, these institutions would engage in different initiatives including consultancies with different private and public sectors as well as designing projects, which can attract funds from different donor organization:

"The Moodle which we are using was sponsored by SIDA funds...and they always facilitate on the ICT development. So we must make sure that first of all there is a financial support. We normally write proposal to university administration that will assist to set financials" (E2).

Other strategies to enhance support were focused on raising e-learning awareness to teachers and management teams so that they see e-learning as crucial and part of learning and teaching:

"Without support from top management, you could be just a little section there trying to make a little business and getting nowhere" (E1).

Awareness raising for teachers was conducted through professional training and would include, but not limited to applications such as multimedia, Internet services and orientation to different functionalities of Learning Management Systems. Professional training supplemented by motivation through incentives was also used as strategies to address problems related to teachers' resistance to change:

"we had a short contract and gave them some remunerations that you create your materials, of course it will belong to the university but, at least you shall be paid a token...So that has motivated some of them" (E7).

In brief, the study suggests that institutions can enhance all strategies that are focused on providing awareness of e-learning to all stakeholders of higher education since awareness deepens perception on usefulness of e-learning approaches in education.

Lessons for adopters

The key factor among all is raising awareness particularly to teachers who are the key players in learning and teaching. Awareness can include both basic and professional ICT skills through seminars/workshop as well as short and long term training locally and abroad. Awareness also addresses the poor perception that e-learning is Internet learning. Through trainings, new adopters can also acknowledge the potential of other electronic media such as radio, television,

intranet, handheld mobile/wireless electronic devices (such as mobile phones, personal digital assistants (PDAs), and smart phones) as well as various services and applications associated with them. Apart from the modern technologies, which, according to the results from this study, are highly constrained with limited infrastructure and support, education stakeholders in Tanzania can also acknowledge the impact of older technologies such as radio, television and CDs, which have a longer and richer history of facilitating the delivery of education to large number of learners in geographically dispersed and socially diverse settings. For example, the famous radio learning programme *School of the Air* from Australia (BBDC et al., 2007). For over 60 years this programme has been using radio as a medium that enabled children located in remote communities to access education and is still in operation today.

Similarly, the use of CDs proved to be a reliable medium of accessing content. On the study that investigated students' experiences as well as challenges of blended learning at the University of Dar es Salaam in Tanzania, Mtebe and Raphael (2013, p. 133) found that "CDs were useful and effective in providing an alternative means to access learning resources" due to the existing slow Internet speed. Other lessons can be obtained from the Open University of the UK, which use print-based material supplemented by radio, television and new emerging technologies (OU 2014).

Awareness raising to teachers is not enough without the support from the management team. Institutions administrators need to be aware of benefits from e-learning to become supportive because they have power to allocate resources particularly on matters related to staff training, ICT infrastructure and on matters related to quality educational practice including e-learning. E-learning awareness can also address teachers' resistance to change.

Secondly, e-learning adoption has costs implications. Institutions need to conduct situational analysis aimed at examined ICT infrastructure as well as level of ICT skills acquired by teachers and what they can afford to provide so as to achieve e-learning. This may also include learning from experienced institutions in e-learning programmes.

Furthermore, **staff retention strategy** is given less attention in HLIs. Through incentives and other motivations schemes institutions can retain its staff, particularly technical support staff so that they do not seek other highly paid jobs outside HLIs and finally, institutions can collaborate with other public and private sectors as well as national and international donor organisations through well-defined and funds attracting projects to address financial constraints. This is within the control of the institution management.

CONCLUSION

This study has sought to shed light on the barriers of e-learning adoptions in Tanzanian HLIs and strategies that can be used to address them. First, it is evident that until to date infrastructural problems, particularly in terms of power supply, bandwidth capacity, computer laboratories including computers, are still associated with barriers of e-learning adoption in HLIs as referred to by other studies (Sife et al., 2007; Mtebe & Raisamo 2011; Nagunwa & Lwoga 2012; Sanga et al., 2013). However, evidence from these institutions shows that there were some measures taken to address these barriers including solar power systems, enhancement of Internet connectivity, and construction of new buildings and establishment of regional centres.

Furthermore, the current government support is not adequate. Institutions are struggling to address financial constraints using their own initiatives. Strategies such as engaging in consultancies, developing funds attracting projects as well as collaborating with partner

institutions and donor organisation were among them identified by the study. The third key factor was e-learning awareness. Effective adoption of e-learning in HLIs would also rely on the knowledge of e-learning including its potential benefits to the education. Trainings enhance knowledge and studies have shown that knowledge can also influence perceptions about the phenomenon under investigation (Fishben & Ajzen 1980; Fazio 2007). This study suggests that training can also be the most effective strategy to address financial constraints, lack of support and teachers' resistance to change.

In summary, e-learning adoption strategies need to be focused in raising awareness of e-learning to all education stakeholders; incorporate more support both technical and managerial as well as include motivation schemes through incentives that can assure effective involvement and retention of its staff (Rolfe, et al., 2008).

ACKNOWLEDGMENT

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